```
SEQUENCE LISTING
      (1) GENERAL INFORMATION:
 5
            i) APPLICANT: Griffith, Irwin J.
                          Kuo, Mei-Chang
                          Luqman, Mohammad
 10
          (ii) TITLE OF INVENTION: T CELL EPITOPES OF RYEGRASS POLLEN.
                                    ALLERGEN
         (iii) NUMBER OF SEQUENCES: 58
15
          (iv) CORRESPONDENCE ADDRESS:
                 (A) ADDRESSEE: LAHIVE & COCKFIELD
                (β) STREET: 60 State Street, suite 510
                (d) CITY: Boston
                    STATE: Massachusetts
20
                (E)
                    COUNTRY: USA
                (F)
                    ZIP: 02109
           (v) COMPUTER READABLE FORM:
                (A) MEDIUM TYPE: Floppy disk
25
                (B) COMPUTER: IBM PC compatible
                (C) OPERATING SYSTEM: PC-DOS/MS-DOS
                (D) SOFTWARE: ASCII Text
\nabla
          (vi) CURRENT APPLICATION DATA:
 30
                (A) APPLICATION NUMBER: US 08/106,016
                (B) FILING DATE: 31-AUG-1993
                (C) CLASSIFICATION:
        (viii) ATTORNEY/AGENT INFORMATION:
 35
                (A) NAME: Amy E. Mandragouras
                (B) REGISTRATION NUMBER: 36,207
                (C) REFERENCE/DOCKET NUMBER: 075 (IMI-040cp2PC)
          (ix) TELECOMMUNICATION INFORMATION:
 40
                (A) TELEPHONE: (617) 227-7400
                (B) TELEFAX (617) 227-5941
      (2) INFORMATION FOR SED ID NO:1:
 45
           (i) SEQUENCE CHARACTERISTICS:
                (A) LENGTH: 1229 base pairs
                (B) TYPE: nucleic acid
                (C) STRANDEDNESS: single
 50
                (D) TOPOLOGY: |inear
```

(ii) MOLECULE TYPE: dDNA





(ix) FEATURE: (A) NAME/KEY: CDS 5 LOCATION: 40..942 (ix) FEATURE: (A) NAME/KEY: mat_peptide 10 (B) LOCATION: 115..940 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:1: CGCTATCCCT CCCTCGTACA AACAAACGCA AGAGCAGCA ATG GCC GTC CAG AAG 15 54 Met Ala Val Gln Lys -25 TAC ACG GTG GCT CTA TTC CTC GCC GTG GCC CTC GTG GCG GGC CCG GCC 102 Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Leu Val Ala Gly Pro Ala 20 -15 -10 -20 GCC TCC TAC GCC GCT GAC GCC GGC TAC ACC CCC GCA GCC GCG GCC ACC 150 Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Thr Pro Ala Ala Ala Ala Thr 25 CCG GCT ACT CCT GCC GCC CCG GCT GCG GCT GGA GGG AAG GCG ACG 198 Pro Ala Thr Pro Ala Ala Thr Pro Ala Ala Gly Gly Lys Ala Thr 15 20 30 ACC GAC GAG CAG AAG CTG CTG GAG GAC GTC AAC GCT GGC TTC AAG GCA 246 Thr Asp Glu Gln Lys Leu Leu Glu Asp Val Asn Ala Gly Phe Lys Ala 35 GCC GTG GCC GCC GCC AAC GCC CCT CCG GCG GAC AAG TTC AAG ATC 294 35 Ala Val Ala Ala Ala Asn Ala Pro Pro Ala Asp Lys Phe Lys Ile 50 TTC GAG GCC GCC TTC TCC GAG TCC TCC AAG GGC CTC CTC GCC ACC TCC 342 40 Phe Glu Ala Ala Phe Ser Glu Ser Ser Lys Gly Leu Leu Ala Thr Ser 70 GCC GCC AAG GCA CCC GGC CTC ATC CCC AAG CTC GAC ACC GCC TAC GAC 390 Ala Ala Lys Ala Pro Gly Leu Ile Pro Lys Leu Asp Thr Ala Tyr Asp 45 80

GTC GCC TAC AAG GCC GCC GAG GCC GAC GCC GAG GCC AAG TAC GAC

Val Ala Tyr Lys Ala Ala Glu Gly Ala Thr Pro Glu Ala Lys Tyr Asp

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438





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|---------|-----|------|------|-------------------|------|------|------|------|------|------|------|------|-------|------|-------|-------|-----|------|
| _ | | | ١, | ACT Thr | | | | | | | | | | | | | | 486 |
| 5 | | | | CAC | | | | | | | | | | | | | | 534 |
| 10 | | | | ACC Thr | | | | | | | | | | | | | | 582 |
| 15 | | | | GCA Ala 160 | | | | | | | | | | | | | | 630 |
| 20 | | | | TTC Phe | | | | | | | | | | | | | | 678 |
| | | | | TAT Tyr | | | | | | | | | | | | | | 726 |
| 25 1 | | | | GCC Ala | | | | | | | | | | | | | | 774 |
| 30 | | | | TTT Phe | | | | | | | | | | Ala | | | | 822 |
| 35 | | | | AAG Lys 240 | Ala | | | | | | | | | | | | | 870 |
| 40 | | | | GCC Ala | | | | | | | | | | | | | | 918 |
| | | | Ala | GGT Gly | | 1 | | Ala | | TCAG | CTT | GCTA | ATAT. | AC T | ACTG. | AACGI | r | 972 |
| 45 | ATG | TATG | TGC | ATGA | TCCG | gg c | GGCG | AGTG | G TT | TTGT | TGAT | AAT | TAAT | CTT | CGTT | TTCGT | ГT | 1032 |
| | TCA | TGCA | .GCC | GCGA | TCGA | ga\g | GGCT | TGCA | T GC | TTGT | ААТА | ATT | CAAT | ATT | TTTC | ATTT | CT | 1092 |
| 50 | TTT | TGAA | TCT | GTAA | ATCC | cc A | TGAC | AAGT | A GT | GGGA | TCAA | GTC | GGCA | TGT | ATCA | CCGT | rg. | 1152 |
| | | | | | | 1 | | | | | | | | | | | | -0-0 |





| | | \ \ \ ! | | | 77 | | | | | | | | | | | | 1229 |
|-----|------------|------------------|-----------|------------|------------|------------|------------|-------------|------------|------------|------------|------------|------------|------------|------------|------------|------|
| | AAAA | AMAA | AAA A | AAAA | MAA | | | | | | | | | | | | 1229 |
| 5 | (2) | INFO | RMAT | 'ION | FOR | SEQ | ID N | 10:2: | | | | | | | | | |
| | | / | (i) S | (A) | LEN | GTH: | 301 | . ami | .no a | | i | | | | | | |
| 10 | | ٠ | \ | (B) (D) | TOP | | | aci inea | | | | | | | | | |
| | | i) | M (fil | OLEC | CULE | TYPE | : pr | otei | .n | | | | | | | | |
| 15 | | (3 | ci√ S | EQUE | ENCE | DESC | RIPT | : NOI | SEÇ |) ID | NO:2 | 2: | | | | | |
| | Met -25 | Ala | Val | Gln | Lys | Tyr -20 | Thr | Val | Ala | Leu | Phe -15 | Leu | Ala | Val | Ala | Leu -10 | |
| 20 | Val | Ala | Gly | Pro | Ala -5 | | Ser | Tyr | Ala | Ala 1 | Asp | Ala | Gly | Tyr 5 | Thr | Pro | |
| | Ala | Ala | Ala 10 | Ala | Thr | Pro | Ala | Thr 15 | Pro | Ala | Ala | Thr | Pro 20 | Ala | Ala | Ala | |
| 25 | Gly | Gly 25 | Lys | Ala | Thr | Thr | Asp 30 | Glu | Gln | Lys | Leu | Leu 35 | Glu | Asp | Val | Asn | |
| 30 | Ala 40 | Gly | Phe | Lys | Ala | Ala 45 | Val | Ala | Ala | Ala | Ala 50 | | Ala | Pro | Pro | Ala 55 | |
| 50 | Asp | Lys | Phe | Lys | Ile 60 | Phe | Glu | Ala | Ala | Phe 65 | Ser | Glu | Ser ! | Ser | Lys 70 | Gly | |
| 35 | Leu | Leu | Ala | Thr 75 | Ser | Ala | Ala | Lys | Ala 80 | Pro | Gly | Leu | Ile | Pro 85 | Lys | Leu | |
| | Asp | Thr | Ala 90 | Tyr | Asp | Val | Ala | Tyr 95 | Lys | Ala | Ala | Glu | Gly 100 | Ala | Thr | Pro | |
| 40 | Glu | Ala 105 | Lys | Tyr | Asp | Ala | Phe 110 | Val | Thr | Ala | Leu | Thr 115 | | Ala | Leu | Arg | |
| 45 | Val 120 | | Ala | Gly | Ala | Leu 125 | Glu | Val | His | Ala | Val 130 | | Pro | Ala | Thr | Glu 135 | _ |
| .5 | Glu | Val | Pro | Ala | Ala 140 | Lys | Ile | Pro | Thr | Gly 145 | | Leu | Gln | Ile | Val 150 | | |
| 50. | Lys | Ile | Asp | Ala 155 | | he | Lys | Ile | Ala 160 | | Thr | Ala | Ala | Asn 165 | | Ala | |

Pro Thr Asn Asp Lys Phe Thr Val Phe Glu Ser Ala Phe Asn Lys Ala



-51-

DOTET FORT





| | | | | | 1 | | | | | | | | | | | | |
|----|------------|------------|------------|---------------------------------|-------------|--------------|-------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-----|
| | Leu | Asn 185 | Glu | Cys | Thr | Gly | Gly 190 | Ala | Tyr | Glu | Thr | Tyr 195 | Lys | Phe | Ile | Pro | |
| 5 | Ser 200 | Leu | Glu | Ala | Ala | Val 205 | Lys | Gln | Ala | Tyr | Ala 210 | Ala | Thr | Val | Ala | Ala 215 | |
| 10 | Ala | Pro | Glu | Val | Lys 220 | Tyr | Ala | Val | Phe | Glu 225 | Ala | Ala | Leu | Thr | Lys 230 | Ala | |
| | Ile | Thr | Ala | Met 235 | Thr | Gln | Ala | Gln | Lys 240 | Ala | Gly | Lys | Pro | Ala 245 | Ala | Ala | |
| 15 | Ala | Ala | Thr 250 | Gly | Ala | Ala | Thr | Val 255 | Ala | Thr | Gly | Ala | Ala 260 | Thr | Ala | Ala | |
| | Ala | Gly 265 | Ala | Ala | Thr | Ala | Ala 270 | Ala | Gly | Gly | Tyr | Lys 275 | Ala | | | | |
| 20 | (2) | INFO | RMAT | rion | FOR | SEQ | ID N | 10:3: | | | | | | | | | |
| | | (i) | | QUENC | ENGTE | : 20 | ami | no a | | . | | | | | | | |
| 25 | | | (E | 3) TY)) TC | | amin GY: | | | • | | | | | | | | , |
| 51 | | (ii) | MOL | ECUI | E TY | PE: | pept | ide | • | | | | ٠. | | 3 | | |
| 30 | | (v) | FRA | GMEN | т ту | PE: | inte | rnal | | | | | | | | • | |
| | | (xi) | SEÇ | UENC | E DE | SCRI | PTIC | N: S | EQ I | D NC |):3: | | F | | | _ | |
| 35 | | Ala 1 | Asp | Ala | Gly | Tyr 5 | Thr | Pro | Ala | Ala | Ala 10 | Ala | Thr | Pro | Ala | Thr 15 | Pro |
| 40 | | | | Thr | 20 | | | | | | | | | | | | |
| | (2) | INFO | RMAT | NOI | FOR | SEQ | ID N | 10:4: | | | | | | | • | | |
| 45 | | (i) | (A (B | UENC L) LE L) TY L) TO | NGTH PE: | : 20 amin | ami o ac | no a | | | | | | | | | |
| | | (ii) | MOL | ECUL | E TY | PE: | pept | ide | | | | | | | | | |
| 50 | | (v) | FRA | GMEN | T TY | PB: | inte | rnal | | | | | | | | | |



| | | (xi) | SEQU | JENCI | E DE | SCRI | PTIO | N: S | EQ I | ои о | :4: | | | | | | |
|----|-----|----------|-------|------------|---------------|-----------------------------|-------------|-------------|-------|------|-----------|-----|-----|-----|-----|-----------|-----|
| 5 | | Ala 1 | Thr | Pro | Ala | Thr 5 | Pro | Ala | Ala | Thr | Pro 10 | Ala | Ala | Ala | Gly | Gly 15 | Lys |
| | | Ala | Thr | Thr | Asp 20 | | | | | | | | | | | | |
| 10 | (2) | INFO | RMATI | 100 | FOR S | SEQ : | ID N | 0:5: | | | | | | • | | ŕ | |
| 15 | | (i) | (B) | T¥1 | IGTH PE: a | ARACT 20 amino | amiı ac: | no ao id | | | | | | - | | | |
| | | (ii) | MOLE | COL | TYI | PE: p | pept: | ide | | | | | | | | | |
| 20 | | (v) | FRAG | MEN | TYI | PE: i | inte | rnal | | | | | | | | | |
| G' | i | (xi) | SEQU | ENCE | DES | SCRIE | OIT | 1: SI | EQ II | on o | :5: | | | | | | |
| 25 | | Ala 1 | Ala | Ala | Gly | Gly 5 | Lys | Ala | Thr | Thr | Asp 10 | Glu | Gln | Lys | Leu | Leu 15 | Glu |
| 30 | | Asp | Val | Asn | Ala 20 | | | | | | | | | | | • | |
| | (2) | INFOR | ITAMS | ON F | ok s | SEQ I | D NO | 0:6: | | | | | - | | | | |
| 35 | | (i) | | LEN TYP | GTH: E: a | ARACT 20 mino Y: 1 | amir aci | o ac | | | | | ŗ | | | • | |
| | | (ii) | MOLE | CULE | TYE | E: p | epti | de | | | | | | | | | |
| 40 | | (v) | FRAG | MENT | TYE | E: i | .nter | mal | | | | | | | | | |
| 45 | | (xi) | SEQU | ENCE | DES | CRIP | TION | I: SE | Q II | NO: | 6: | | | | | • | |
| | | Glu 1 | Gln | Lys | Leu | Leu 5 | Glu | Asp | Val | Asn | Ala 10 | Gly | Phe | Lys | Ala | Ala 15 | Val |
| 50 | | Ala | Ala . | Ala | Ala 20 | | | | | | | | | | | | |
| | (2) | INFOR | ITAMS | ON F | OR S | ер 1 | D NC |):7: | | | | | | | | | |

(i) SEQUENCE CHARACTERISTICS: (A) LENGTH: 20 amino acids (B) TYPE: amino acid 5 (D) TOPOLOGY: linear (ii) MOLECULE TYPE: peptide (v) FRAGMENT TYPE: internal 10 (xi) SEQUENÇE DESCRIPTION: SEQ ID NO:7: 15 Gly Phe Lys Ala Ala Val Ala Ala Ala Ala Asn Ala Pro Pro Ala Asp 5 15 Lys Phe Lys Ile 20 (2) INFORMATION FOR SEQ ID NO:8: (i) SEQUENCE CHARACTERISTICS: (A) LENGTH: 20 amino acids (B) TYPE: amino acid (D) TOPOLOGY: linear (ii) MOLECULE TYPE: peptide 30 (v) FRAGMENT TYPE: internal (xi) SEQUENCE DESCRIPTION: SEQ ID NO:8: 35 Asn Ala Pro Pro Ala Asp Lys Phe Lys Ile Phe Glu Ala Ala Phe Ser 10 Glu Ser Ser Lys 40 20 (2) INFORMATION FOR SEQ ID NO:9: (i) SEQUENCE CHARACTERISTICS: 45 (A) LENGTH 20 amino acids (B) TYPE: amino acid (D) TOPOLOGY: linear (ii) MOLECULE TYPE: peptide 50

(v) FRAGMENT TYPE: internal



| | (xi) | SEQUENCE | DESCRI | PTION: S | EQ ID | NO: | 9: | | | | | | |
|----|----------|-----------|--------------|-------------------|-------|-----|-----------|-----|-----|-----|-----|-----------|------|
| 5 | Phe 1 | Glu Ala | Ala Phe 5 | Ser Glu | Ser | | Lys 10 | Gly | Leu | Leu | Ala | Thr 15 | Ser |
| 10 | | Ala Lys | 20 | | | | | | | | | | |
| | (2) INFO | RMATION F | OR SEQ | ID NO:10 | : | | | | | | | | |
| 15 | (i) | (B) TYP | | amino a o acid | | | | | | | | | • |
| | (ii) | MOLECUL | TYPE: | peptide | | | | | | | | | |
| 20 | (v) | FRAGMENT | TYPE: | internal | | • | | | | | | | |
| 25 | (xi) | SEQUENCE | DESCRI | PTION: S | EQ ID | NO: | 10: | | | | | | |
| ۸۱ | Gly 1 | Leu Leu | Ala Thr | Ser Ala | Ala | | Ala 10 | Pro | Gly | Léu | | Pro 15 | Lys |
| 30 | Leu | Asp Thr | Ala 20 | | | | | | | | | | |
| | (2) INFO | RMATION F | OR SEQ | ID NO:11 | : | | | - | 1 | | | | |
| 35 | (i) | (B) TYP | 1 | amino a o acid | | | | | | | | | |
| 40 | (ii) | MOLECULE | TYPE: | peptide | | | | • | | | | | |
| | (v) | FRAGMENT | TYPE: | internal | | | | | | | | | |
| 45 | (xi) | SEQUENCE | DESCRI | PTION: S | EQ ID | NO: | 11: | | | | | | |
| 50 | Pro 1 | Gly Leu | Ile Pro | Lys Leu | Asp | | Ala 10 | Tyr | Asp | Val | Ala | Туг 15 | ·Lys |
| 50 | Ala | Ala Glu | Gly | | | | | | | | | | |



| | | (2) | INFOR | ифітамя | FOR SEQ ID NO:12: | | | |
|----------|-----|-----|----------|------------------|--|-------|-----------|-----|
| | 5 | | (i) | (A) LE (B) TY | E CHARACTERISTICS: NGTH: 20 amino acids PE: amino acid POLOGY: linear | | | |
| | 10 | | (ii) | MOLECUL | E TYPE: peptide | | | |
| | | | (v) | FRAGMEN | TYPE: internal | | | |
| | 15 | | (xi) | SEQUENC | E DESCRIPTION: SEQ ID NO:12: | | | |
| 3 | | | Tyr 1 | Asp Val | Ala Tyr Lys Ala Ala Glu Gly Ala Thr Pr 5 10 | o Glu | Ala 15 | Lys |
| | 20 | | Tyr | Asp Ala | Phe 20 | | | |
| | | (2) | INFOR | NOITAMS | FOR SEQ ID NO:13: | | | |
| | C₁\ | | (i) | (A) LE (B) TY | E CHARACTERISTICS: NGTH: 20 amino acids PE: amino acid POLOGY: linear | ; | | |
| | 30 | | (ii) | MOLECUL | E TYPE: peptide | • | | |
| | | | (v) | FRAGMEN | TYPE: internal | | - | |
| | 35 | | (xi) | SEQUENC | DESCRIPTION: SEQ ID NO:13: | | | |
| | 40 | | Ala 1 | Thr Pro | Glu Ala Lys Tyr Asp Ala Phe Val Thr Al 5 10 | a Leu | Thr 15 | Glu |
| | | | Ala | Leu Arg | Val 20 | | | |
| | 45 | (2) | INFO | RMATION | FOR SEQ ID NO:14: | | | |
| | | | (i) | (A) LE (B) TY | E CHARACTERISTICS: NGTH: 20 amino acids PE: amino acid | | | |
| | 50 | | (;;) | | PDLOGY: linear E TYPE: peptide | | | |
| | | | (11) | NOTECOL | HITE: pepcide | | | |

| | | (v) | FRAGMENT | 'TYPE: | internal | - | | | | | | | | |
|------------------|-----|----------|--------------------------|--------------------|-------------------|-------|-----|-----------|-----|--------------------|-----|-----|-----------|-----|
| 5 | | (xi) | SEQUENCE | DESCRI | PTION: S | EQ ID | NO: | :14: | | | | | | |
| | | Val 1 | Thr Ala | Leu Thi | Glu Ala | Leu | Arg | Val 10 | Ile | Ala , | Gly | Ala | Leu 15 | Glu |
| 10 | | Val | His Ala | Val 20 | | | | | | | | | | |
| | (2) | INFO | RMATION F | OR SEQ | ID NO:15 | · · | ٠ | | | | | | | |
| 15 | | (i) | | GTH: 20 E: amir | amino a o acid | | | | | | | | | |
| 20 | | (ii) | MOLECULE | TYPE: | peptide | | | | | | | | | |
| | | (v) | FRAGMENT | TYPE: | internal | | | | | | | | | |
| 25 | | | | | | | | | | | | | | |
| - (| | (xi) | SEQUENCE | DESCRI | PTION: S | EQ ID | NO: | 15: | | • | | , | | |
| 1 \ 30 | | Ile 1 | Ala Gly | Ala Leu 5 | ı Glu Val | His | Ala | Val 10 | Lys | Pro | Ala | Thr | Glu 15 | Glu |
| 30 | | Val | Pro Ala | Ala 20 | | | | | • | ج ^ا ر . | | | | |
| 35 | (2) | INFO | RMATION F | OR SEQ | ID NO:16 | : | | | | | | | - | |
| 33 | | (i) | SEQUENCE (A) LEN (B) TYP | GTH: 20 | amino a | | | | | | | | | |
| 40 | | | (D) TOP | progx: | linear | | | | | | | | | |
| | | (ii) | MOLECULE | TYPE: | peptide | | | | | | | | | |
| | | (v) | FRAGMENT | TYPE: | internal | | | | | | | | | |
| 45 | | | | | | | | | | | | | | |
| | | (xi) | SEQUENCE | DESCRI | PTION: S | EQ ID | NO: | 16: | | | | | | |
| 50 | | Lys 1 | Pro Ala | Thr Glu 5 | ı Glu Val | Pro | Ala | Ala 10 | Lys | Ile | Pro | Thr | Gly 15 | Glu |

Leu Gln Ile Val

(ii) MOLECULE TYPE: peptide

| | | | , | 20 | | | | | | | | | | |
|------------|-----|------------|------------------|--------------------|--------------------------------|--------|------|-----------|-----|-----|-----|-----|-----------|-----|
| | | | | 20 | • | | | | | | | | | |
| | (2) | INFORMAT | ON F | OR SEQ | ID NO:1 | 7: | | | | | | | | |
| 5 | | (<i>1</i> | A) LEN | | | | | | | | | | | |
| 10 | | (ii) MOI | redure | TYPE: | peptide | | | | | | | | | |
| | | (v) FR | 7GWENJ | TYPE: | interna | 1 | | | | | | | | |
| 15 | | (xi) SE(| QUENCE | DESCRI | IPTION: | SEQ ID | NO: | 17: | | | | | | |
| 20 | | Lys Ile | Pro | Thr Gly | y Glu Le | u Gln | Ile | Val 10 | Asp | Lys | Ile | Asp | Ala 15 | Ala |
| | | Phe Lys | 3 Ile | Ala 20 | | | | | | | | | | |
| 25 | (2) | INFORMA' | TION F | FOR SEQ | ID NO:1 | 8: | | | | | , | | | |
| ر <i>ا</i> | | () (1 | A) LE B) TY | | | | | | | | | : | | |
| 30 | | (ii) MO | LECULI | TYPE: | peptide | : | | | - | £ | | | | |
| | | (v) FR | AGMENT | TYPE: | interna | .1 | | | | | | | - | |
| 35 | | | | | | | | | | | | | | |
| | | (xi) SE | QUENCI | DESCR: | IPTION: | SEQ II | ON C | :18: | | | | | | |
| 40 | | 1 | | 5 | a Ala Ph | e Lys | Ile | Ala 10 | Ala | Thr | Ala | Ala | Asn 15 | Ala |
| | | Ala Pr | o Thr | Asn 20 | | | | | | | | | | |
| 45 | (2) | INFORMA | TION I | FOR SEQ | ID NO:1 | .9: | | | | | | | • | |
| | | (| A) LEI B) TYI | NGTH: 2 PE: ami | CTERISTI O amino no acid | | | | | | | | | |
| 50 | | (| D) TO | POLOGY: | linear | | | | | | | | | |



| | | (v) | FRAG | MENT | YY | PE: | inte | rnal | | | | | | | | | |
|----|-----|----------|--------------------|--------------|--------------|-------------------|---------------|-------------|-------|------|-----------|-----|-----|-----|-----|-----------|-----|
| 5 | | (xi) | SEQU | ENCE | DES | SCRI | PTION | 1: SI | EQ II | OM C | :19: | | | | | | |
| 10 | | 1 | Thr | | | Asn 5 | Ala | Ala | Pro | Thr | Asn 10 | Asp | Lys | Phe | Thr | Val 15 | Phe |
| | | Glu | Ser | | Phe 20 | | | | | | • | | | | | | |
| 15 | (2) | | RMATI | | 1 | | | | | , | | | | | | | |
| | | (1) | | LENO TYPI | GTH: E: 6 | 20 min | amir | no ao id | | | | | | | | | |
| 20 | | (ii) | MOLE | CULE | TYI | <u>}</u> ₽#: ; | pepti | ide | | | | | , | | | | |
| | | (v) | FRAG | MENT | TYI | PE: : | inter | nal | | | | | | | | | |
| 25 | | | | | | | | | | | | | | , | | | |
| 11 | | (xi) | SEQU | ENCE | DES | SCRI: | MOITS | 1: SI | EQ II | ON C | :20: | | • | | | | |
| 30 | | Asp 1 | Lys | Phe : | Thr | Vall | Phe | Glu | Ser | Ala | Phe 10 | Asn | Lys | Ala | Leu | Asn 15 | Glu |
| | | Cys | Thr | | 31y 20 | | | | | | | | , p | | | | |
| 35 | (2) | INFO | RMATI | ON FO | OR S | SEQ | ID NO |):21 | : | | | | | | | • | |
| 40 | | (i) | SEQU (A) (B) | LENG | GTH: | : 20 amin | amir o aci | io ad id | | | | | | | | | |
| 40 | | (ii) | MOLE | TOPO | | | | | | | | | | | | | |
| 45 | | (v) | FRAG | MENT | TYI | ?E: | inter | cnal | | | | | | | | | |
| | | (xi) | SEQU | ENCE | DES | SCRI | OIT | 1: SI | EQ II | OM C | :21: | | | | | | |
| 50 | | Asn 1 | Lys | Ala 1 | Leu | Asn 5 | Glu | Cys | Thr | Gly | Gly 10 | Ala | Tyr | Glu | Thr | Tyr 15 | Lys |



Phe Ile P Ser 5 (2) INFORMATION FOR SEQ ID NO:22: 10 (i) SEQUENCE CHARACTERISTICS: (A) LENGTH: 20 amino acids (B) TYPE: amino acid (D) TOPOLOGY: linear 15 (ii) MOLECULE TYPE: peptide (v) FRAGMENT TYPE: internal 20 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:22: Ala Tyr Glu Thr Tyr Lys Phe Ile Pro Ser Leu Glu Ala Ala Val Lys 25 Gln Ala Tyr Ala (2) INFORMATION FOR SEQ ID NO:23: 30 (i) SEQUENCE CHARACTERISTICS: (A) LENGTH: 20 amino acids (B) TYPE: amino acid (D) TOPOLOGY: linear 35 (ii) MOLECULE TYPE: peptide (v) FRAGMENT TYPE: internal 40 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:23: Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala Ala 45 Pro Glu Val Lys 20 50 (2) INFORMATION FOR SEQ ID NO:24:

(i) SEQUENCE CHARACTERISTICS:



| | | | (B) | LENGTH TYPE: TOPOLO | amir | o acid | acids | | | | | | | | |
|----|-----|----------|------------|-------------------------------|--------------|-----------------|----------|------|-----------|-----|-----|-----|-----|-----------|-----|
| 5 | | (ii) | MOLE | CULE TY | PE: | peptide | e | | | | | | | | |
| | | (v) | FRAGI | MENT TY | PE: | interna | al | | | | | | • | | |
| 10 | | (xi) | SEQUI | ENCE DE | SCRI | PTION: | SEQ II | OM C | :24: | | | | | | |
| 15 | | Ala 1 | Thr V | Val Ala | Ala 5 | ı Ala Pı | co Glu | Val | Lys 10 | Tyr | Ala | Val | Phe | Glu 15 | Ala |
| 15 | | Ala | Leu 1 | Thr Lys 20 | | | | | | | | | | | |
| 20 | (2) | INFO | RMATIO | ON FOR | EQ | ID NO:2 | 25: | | | | | | | | |
| a١ | | (i) | (A) (B) | ENCE CH LENGTH TYPE: 7 | : 20 amin | amino o acid | | | | | | | | | |
| 25 | | (ii) | MOLEC | CULE TY | PE: | peptide | : | | | | | , | | | |
| | | (v) | FRAGN | MENT TY | PE: | interna | ıl | | | | | | | | |
| 30 | | | ٠. | | | | | | | | | | | | |
| | | (xi) | SEQUE | ENCE DE | SCRI | PTION: | SEQ ID | NO: | 25: | - | ,f | | | | |
| 35 | | Tyr 1 | Ala V | al Phe | Glu 5 | Ala Al | a Leu | Thr | Lys 10 | Ala | Ile | Thr | Ala | Met 15 | Thr |
| | | Gln | Ala (| In Lys 20 | | | | | | | | | | | |
| 40 | (2) | INFO | RMATIC | ON FOR | SEQ | ID NO:2 | :6: | | | | | | | | |
| 45 | | (i) | (A) (B) | ENCE CHA LENGTH TYPE: 6 | : 20 amin | amino o acid | | | | | | | | | |
| | | (ii) | MOLEC | CULE TY | ₽#: | peptide | <u>.</u> | | | | | | | | |
| 50 | | (v) | FRAGN | MENT TY | PE: | interna | 1 | | | | | | | | |

| | | (xi) | SEQUENCE | DESCRIP | TION: SE | EQ ID NO | :26: | | | | | | |
|---------------------|----|----------|--------------------|--|-----------------|----------|-----------|-----|-----|-----|-----|-----------|-----|
| | 5 | Ala 1 | Ile Thr | Ala Met 5 | Thr Gln | Ala Gln | Lys 10 | Ala | Gly | Lys | Pro | Ala 15 | Ala |
| | | Ala | Ala Ala | Thr 20 | | | | | - | | | | |
| | 10 | (2) INFO | NOITAMS | OR SEQ I | D NO:27 | : | | | | | | | |
| | 15 | (i) | (A) LEN (B) TYP | CHARACT GTH: 20 E: amino OLOGY: 1 | amino ao | | | · | | | | | • |
| | | (ii) | MOLECULE | TYPE: p | eptide | | | | | | | | |
| | 20 | (v) | FRAGMENI | TYPE: i | nternal. | | | | | | | | |
| u S | - | (xi) | SEQUENCE | DESCRIP | PTION: S | EQ ID NO | :27: | | | | | | |
| | 25 | Ala 1 | Gly Lys | Pro Ala 5 | Ala Ala | Ala Ala | Thr 10 | Gly | Ala | Ala | Thr | Val 15 | Ala |
| Li | | Thr | Gly Ala | Ala 20 | | | | | | | | | |
| | 30 | (2) INFO | RMATION I | OR SEQ 1 | ID NO:28 | : | | | F | | | | |
| ₩ ° | 35 | (i) | (B) TYI | CHARACT GTH: 20 E: amino OLOGY:] | amino a acid | | | | | | | | |
| | | (ii) | MOLECULI | | | , | | | | | | | |
| | 40 | | FRAGMEN | | | | | | | | | • | |
| | 45 | Gly | SEQUENC | Thr Val | | | a Ala | Thr | Ala | Ala | Ala | | Ala |
| | 50 | 1 Ala | Thr Ala | 5 Ala 20 | | | 10 | | | | | 15 | |
| | | (2) INFO | RMATION | FOR SEQ | ID NO:29 | €: | | | | | | | |



| | 5 | (i) | (B) TYPE: | HARACTERIS H: 16 amin amino aci OGY: linea | o acids d | | | | | |
|-----------|----|----------|------------------|---|----------------|---------------|-------|---------|-----------|--------|
| | | (ii) | MOLECULE TY | PE: pepti | de | | | | | |
| | 10 | (v) | FRAGMENT TY | PE: inter | nal | | | | | |
| | | (xi) | SEQUENCE DI | ESCRIPTION | : SEQ ID NO: | :29: | | | | · • |
| | 15 | Thr 1 | Ala Ala Ala | a Gly Ala 5 | Ala Thr Ala | Ala Ala 10 | Gly G | ly Tyr | Lys 15 | Ala |
| | 20 | (2) INFO | RMATION FOR | SEQ ID NO | :30: | | | | | |
| | 25 | (i) | (B) TYPE: | HARACTERIS H: 20 amin amino aci OGY: linea | o acids d | | | | | |
| • | 25 | (ii) | MOLECULE T | YPE: pepti | de | | | | | |
| = | 7 | (v) | FRAGMENT T | YPE: inter | rnal | • | | | • | |
| | 30 | | ٠. | | | • | | | | |
| lund thun | | (xi) | SEQUENCE D | ESCRIPTION | 1: SEQ ID NO | :30: | 1 | | | |
| | 35 | Ile 1 | Ala Lys Va | l Pro Pro 5 | Gly Pro Asn | Ile Thr | Ala G | ilu Tyr | Gly 15 | Asp |
| | | Lys | Trp Leu As 20 | p | | • | | | | |
| | 40 | (2) INFO | RMATION FOR | SEQ ID NO | 0:31: | | | | • | |
| | 45 | (i) | (B) TYPE: | HARACTERIS H: 20 amin amino ac: OGY: linea | no acids id | | | | | |
| | | (ii) | MOLECULE I | YPE: pept | ide | | | | | |
| | 50 | (v) | FRAGMENT 7 | YPE: inte | rnal | | ÷ | | | |

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:31: Ile Ala Lys Val Xaa Pro Gly Xaa Asn Ile Thr Ala Glu Tyr Gly Asp 5 15 Lys Trp Leu Asp 10 (2) INFORMATION FOR SEQ ID NO:32: (i) SEQUENCE CHARACTERISTICS: (A) LENGTH: 20 amino acids (B) TYPE: amino acid 15 (D) ΤΟΡΦLOGY: linear (ii) MOLECULE TYPE: peptide (v) FRAGMENT TYPE: internal 20 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:32: 25 Thr Ala Glu Tr Gly Asp Lys Trp Leu Asp Ala Lys Ser Thr Trp Tyr . 10 Gly Lys Pro Thr 20 30 (2) INFORMATION FOR SEQ ID NO:33: (i) SEQUENCE CHARACTERISTICS: (A) LENGTH: 20 amino acids 35 (B) TYPE: amino acid (D) TOPOLOGY: linear (ii) MOLECULE TYPE: peptide 40 (v) FRAGMENT TYPE: internal (xi) SEQUENCE DE\$CRIPTION: SEQ ID NO:33: 45 Gly Ala Gly Pro Lys Asp Asn Gly Gly Ala Cys Gly Tyr Lys Asn Val Asp Lys Ala Pro 50 . 20

(2) INFORMATION FOR \$EQ ID NO:34:



| 5 | (i) | SEQUENCE C (A) LENGT (B) TYPE: (D) TOPOL | H: 20 amin | amino o acio | o acids d | | | | | | | | |
|-------|----------|--|------------------|------------------|----------------|-------|-----------|-----|------------|-----|-----|-----------|-----|
| | (ii) | MOLECULE T | YPE:] | pepti | de | | | | | | | | |
| 10 | (v) | FRAGMENT T | YPE: | inter | nal | | | | | | | | |
| | (xi) | SEQUENCE D | ESCRI | PTION | : SEQ I | D NO: | 34: | | | | | | |
| 15 | Gly 1 | Ala Gly Pr | o Lys 5 | Asp 2 | Asn Gly | Gly | Ala 10 | Cys | Gly | Tyr | Lys | Asp 15 | Val |
| 20 | Asp | Lys Ala Pr 20 | İ | | | | | | | | | | |
| 20 | (2) INFO | RMATION FOR | SEQ | ID NO | :35: | | | | | | | | |
| 25 | (i) | SEQUENCE C (A) LENGT (B) TYPE: | н: 20 | amin | o acids | | | | | | | | |
| () | | (D) TOPOI | OGY : | linea | r | | | | • | , | į | | |
| ~ (i | (ii) | MOLECULE T | YPE: | pepti | de | | | | | | | | |
| 30 | (v) | FRAGMENT 1 | YPE: | inter | nal | | | • | | | | | |
| | (vi) | SEQUENCE I | FSCBT | · DTTON | · SEO I | D NO | .35. | | <i>.</i> f | | | _ | |
| 35 | | Gly Tyr Ly | | | | | | Phe | Asn | Gly | Met | Thr 15 | Gly |
| 40 | Cys | Gly Asn T | | | | | | | | | | · | |
| | (2) INFO | RMATION FO | R SEQ | ID NO |):36: | | | | | | | | |
| 45 | (i) | SEQUENCE (A) LENGT (B) TYPE: (D) TOPOI | ΓΗ: 20 : amir |) amin no aci | no acida ld | 3 | | | | | | | |
| 50 | (ii) | MOLECULE | TYPE: | pepti | ide | | | | | | | | |
| 50 | (v) | FRAGMENT : | TYPE: | inter | cnal | | | | | | | | |

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```
(xi) SEQUENCE DESCRIPTION: SEQ ID NO:36:
         Phe Asn Gly Met Thr Gly Cys Gly Asn Thr Pro Ile Phe Lys Asp Gly
5
                          5
         Arg Gly Cys Gly
10
     (2) INFORMATION FOR SEQ ID NO:37:
          (i) SEQUENCE CHARACTERISTICS:
               (A) LENGTH: 20 amino acids
               (B) TYPE: amino acid
15
               (D) TOPOLOGY: linear
         (ii) MOLECULE TYPE: peptide
          (v) FRAGMENT TYPE: internal
         (xi) SEQUENCE DESCRIPTION: SEQ ID NO:37:
          Pro Ile Phe Lys Asp Gly Arg Gly Cys Gly Ser Cys Phe Glu Ile Lys
          Cys Thr Lys Pro
                      2 b
30
     (2) INFORMATION FOR SEQ ID NO:38:
          (i) SEQUENCE CHARACTERISTICS:
                (A) LENGTH: 20 amino acids
35
                (B) TYPE amino acid
                (D) TOPOLOGY: linear
         (ii) MOLECULE TYPE: peptide
40
          (v) FRAGMENT TYPE: internal
          (xi) SEQUENCE DESCRIPTION: SEQ ID NO:38:
45
          Ser Cys Phe Glu Ile Lys Cys Thr Lys Pro Glu Ser Cys Ser Gly Glu
                                                                    1.5
                                                10
          Ala Val Thr Val
50
                       20
      (2) INFORMATION FOR SEQ ID NO:39:
```



| | 5 | | (i) s | (B) | ENCE LENG TYPE TOPO | TH: | 20 inc | amin aci | o a .d | | | | | | | | | |
|--|-----|-----|----------|---------------------------|------------------------------|--------------|-----------|-------------|------------|----------|------|-----------|-----|-----|-----|-----|-----------|-----|
| | | (| ii) l | MOLEC | COLE | TYPE | E: p | epti | de | | | | | | | | | |
| | 10 | | (v) | FRAGN | 1ENT | TYPE | g: i | .nter | rnal | | | | | | | | - | |
| | | (| (xi) | SEQUI | ENCE | DESC | CRII | 10IT | 1: S | EQ II | ONO: | 39: | | | | | | |
| | 15 | | Glu 1 | Ser (| Cys S | ١. | 3ly 5 | Glu | Ala | Val | Thr | Val 10 | Thr | Ile | Thr | Asp | Asp 15 | Asn |
| i finiti finiti | | | Glu | Glu 1 | | Ile 20 | | | | | | | | | | | | |
| M. M | 20 | (2) | INFOR | ITAM | ON FO | OR SI | EQ : | ID NO | 0:40 | : | | | | | | | | |
| I II Graff Graff affine draw affare farall duals | 25. | | (i) | SEQU (A) (B) (D) | LENC TYPE | GTH: E: a | 20 min | | no a id | | | • | | | , | | | |
| ≠ ± (| 91 | | (ii) | MOLE | CULE | TYP | E: : | pept | ide | | | | | | | 3 | • | |
| | 30 | | (v) | FRAG | MENT | TYP | Ε: | inte | rnal | <u>-</u> | | | | | | | | |
| | | | | | | 1 | | | | | | | | .f | | | | |
| | 35 | | (xi) | SEQU | ENCE | DES | CRI | PTIO | N: 5 | SEQ I | D NO | :40: | | | | | | |
| | | | Thr 1 | Ile | Thr . | Asp | Asp 5 | Asn | Gl | ı Glu | Pro | Ile 10 | Ala | Pro | Tyr | His | Phe 15 | Asp |
| | 40 | | Leu | Ser | _ | His 20 | | | | | | | | | | | , | |
| | | (2) | INFO | RMATI | ON F | OR S | EQ | ID N | 10:4 | 1: | | | | | | | | |
| | 45 | | (i) | (B) | JENCE LEN TYP TOP | GTH: | 20 mir | ami o ac | no cid | | 5 | | | | | | | |
| | | | (ii) | MOLI | ECULE | TYI | E: | pept | ide | | | | | | | | | |
| | 50 | | (v) | FRA | GMENT | r TYI | E: | inte | erna | 1 | | | | | | | | • |

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| | (xi) | SEQUENÇE DE: | SCRIPTIO | N: SEO II | NO:41: | | | | | | |
|----|----------|--|------------------------|----------------|----------|-------|-------|------------|-------|-----|--------|
| | | 1 | | | | | Dho | ~ 3 | Com | Mo+ | 77. |
| 5 | Ala 1 | Pro Tyr His | 5 | Leu ser | 10 | Ala | PHE | GIĀ | ser | 15 | АІА |
| | Asp | Asp Gly Glu 20 | | | | | | | | | |
| 10 | (2) INFO | RMATION FOR | SEQ ID N | 0:42: | | | | | | | |
| 15 | (i) | SEQUENCE CH. (A) LENGTH (B) TYPE: (D) TOPOLO | : 20 amin amino ac: | no acids id | | | | | | • | · • |
| | (ii) | MOLECULE | PE: pept | ide | | | | | | | |
| 20 | (v) | FRAGMENT TY | PE: inte | rnal | | | | | | | |
| | (xi) | SEQUENCE DE | SCRIPTIO | N: SEQ I | D NO:42: | | | | | | |
| 25 | | Phe Gly Ser | | Asp Asp | | ı Glu | Gln | Ļys | Leu | | Ser |
| 71 | 1 Ala | Gly Glu Leu 20 | 5 | | 10 | | • | | ٠ | | |
| 30 | | ٠. | | | | | | | | | |
| | (2) INFO | RMATION FOR | SEQ ID N | 0:43: | | - | £ | | | | |
| 35 | (i) | SEQUENCE CH (A) LENGTH (B) TYPE: (D) TOPOLO | : 20 ami amino ac | no acids id | | | | | | | |
| | (ii) | MOLECULE TY | PE: pept | ide | | | | | | | |
| 40 | (v) | FRAGMENT TY | PE: inte | rnal | • | | | | | | |
| 45 | | SEQUENCE DE | | | | | . Leu | . Gln | . Phe | Arg | Arg |
| 50 | Val | Lys Cys Lys 20 | 3 | | | | | | | | |



| | | | / | | | | | | | | | |
|----|-----|----------|--|--|----------------|----------------|-----|-------|-----|----------|-----------|-----|
| | (2) | INFO | RMATION FOR | SEQ ID N | 0:44: | | | | | | | |
| 5 | | (i) | SEQUENCE C (A) LENGT (B) TYPE: (D) TOPOL | H: 20 ami amino ac | no acids id | | | | • | | | , |
| 10 | | (ii) | MOLECULE T | YPE: pept | ide | | | | | | | |
| | | (v) | FRAGMENT T | YPE: inte | rnal | | | | | | | |
| 15 | | (xi) | SEQUENCE D | ESCRIPTIO | N: SEQ ID | NO:44: | | | | | | |
| | | Glu 1 | Leu Gln Ph | e Arg Arg 5 | Val Lys | Cys Lys, 10 | Tyr | Pro | Asp | Asp | Thr 15 | Lys |
| 20 | | Pro | Thr Phe Hi | s | | | | | | • | | |
| | (2) | INFO | RMATION FOR | SEQ ID N | 0:45: | | | | | | | |
| 25 | | (i) | (B) TYPE: | HARACTERI H: 20 ami amino ac GY: line | no acids id | | | · · · | , | <u>:</u> | | |
| 30 | | (ii) | MOLECULE T | YPE: pept | ide | • | | | | | | |
| | | (v) | FRAGMENT T | YPE: inte | rnal | | | £ | | | | |
| 35 | | (xi) | SEQUENCE D | ESCRIPTIO | N: SEQ II | NO:45: | | | | | | |
| 40 | | 1 | Pro Asp As Asn Tyr Le | 5 u | Pro Thr | Phe His | Val | Glu | Lys | Ala | Ser 15 | Asn |
| 45 | (2) | INFO | RMATION FOR | | 0:46: | | | | | | | |
| | | (i) | (B) TYPE: | HARACTERI H: 20 ami amino ac OGY: line | no acids id | | | | | | | |
| 50 | | (ii) | MOLECULE 1 | | | | | | | | | |



| | | (v) | FRAGMENT | TYPE: | inter | nal | | | | | | | | |
|------------|-----|----------|-------------------------------------|------------------|---------------------|--------------|-------|-----------|-----|-----|-----|-----|-----------|-----|
| 5 | | (xi) | SEQUENCE | DESCR | IPTION | : SEQ II | ONO: | 46: | | | | | | |
| | | Val 1 | Glu Lys 1 | Ala Se 5 | r Asn I | Pro Asn | Tyr | Leu 10 | Ala | Ile | Leu | Val | Lys 15 | Tyr |
| 10 | | Val | Asp Gly | Asp 20 | | | | | | | | | | |
| | (2) | INFO | RMATION FO | OR SEQ | ID NO | :47: | | | | | | | | |
| 15 | | (i) | SEQUENCE (A) LENG (B) TYPI (D) TOPG | TH: 2 : ami | 0 amino no acio | o acids 1 | | | | | | | | |
| 20 | | (ii) | MOLECULE | TYPE: | peptio | đe | | | | | | | | |
| | | (v) | FRAGMENT | TYPE: | inter | nal | | | | | | | | |
| 25 C. I | | (xi) | SEQUENCE | DESCR | IPTION | : SEQ II | D NO: | :47: | | | • | į | | |
| 30 | | Val 1 | Glu Lys (| ly Se 5 | r Asn l | Pro Asn | Tyr | Leu 10 | Ala | Ile | Leu | Val | Lys 15 | Tyr |
| | | Val | Asp Gly | Asp 20 | | | • | | - | £ | | | | |
| 35 | (2) | INFO | RMATION F | OR SEC | ID NO | :48: | | | | | | | - | |
| | | (i) | | GTH: 2 E: ami | 0 amino .no acio | o acids d | | | | | | | | |
| 40 | | | (D) TOP | | | | | | | | | | | |
| | | | MOLECULE | | | | | | | | | | | |
| 45 | | (V) | FRAGMENT | TYPE: | inter | nal | | | | | | | | |
| | | (xi) | SEQUENCE | PESCE | RIPTION | : SEQ I | D NO | :48: | | | | | | |
| 50 | | Ala 1 | Ile Leu | Val Ly | s Tyr | Val Asp | Gly | Asp 10 | Gly | Asp | Val | Val | Ala 15 | Val |
| | | Asp | Ile Lys | Glu | | | | | | | | | | |

DB737904.11E096 41



| | (2) | INFORMATION FOR SEQ ID NO:49: |
|----|-----|---|
| 5 | | (i) SEQUENCE CHARACTERISTICS: (A) LENGTH: 20 amino acids (B) TYPE: amino acid (D) TOPOLOGY: linear |
| 10 | | (ii) MOLECULE TYPE: peptide |
| 10 | | (v) FRAGMENT TYPE: internal |
| 15 | | (xi) SEQUENCE DESCRIPTION: SEQ ID NO:49: |
| | | Gly Asp Val Val Ala Val Asp Ile Lys Glu Lys Gly Lys Asp Lys Trp 10 15 |
| 20 | | Ile Glu Leu Lys 20 |
| | (2) | INFORMATION FOR SEQ ID NO:50: |
| 25 | | (i) SEQUENCE CHARACTERISTICS: (A) LENGTH: 20 amino acids |
| G/ | | (B) TYPE: amino acid (D) TOPOLOGY linear |
| 30 | | (ii) MOLECULE TYPE: peptide |
| | | (v) FRAGMENT TYPE: internal |
| 35 | | (xi) SEQUENCE DESCRIPTION: SEQ ID NO:50: |
| 40 | | Lys Gly Lys Asp Lys Trp Ile Glu Leu Lys Glu Ser Trp Gly Ala Val |
| | | Trp Arg Ile Asp 20 |
| 45 | (2) | INFORMATION FOR SEQ ID NO:51: |
| | | (i) SEQUENCE CHARACTERISTICS: (A) LENGTH: 20 amino acids (B) TYPE: amino acid |
| 50 | | (D) TOPOLOGY: linear |
| | | (ii) MOLECULE TYPE: peptide |

Ser Glu Val Glu Asp Val Ile Pro Glu Gly Trp Lys Ala Asp Thr Ser

50

Tyr Ser Ala Lys





| | | (2) INFORMATION FOR SEQ ID NO:54: |
|-----------------|----|---|
| | 5 | (i) SEQUENCE CHARACTERISTICS: (A) LENGTH: 33 amino acids (B) TYPE: amino acid (D) TOPOLOGY: linear |
| | 10 | (ii) MOLECULE TYPE: peptide |
| | 10 | (v) FRAGMENT TYPE: N-terminal |
| | 15 | (xi) SEQUENCE DESCRIPTION: SEQ ID NO:54: |
| | | Ala Asp Ala Gly Tyr Thr Hyp Ala Ala Ala Ala Thr Hyp Ala Thr Hyp 1 10 15 |
| 45cm Ama 'la | 20 | Ala Ala Thr Hyp Ala Ala Ala Gly Gly Lys Ala Thr Thr Asp Glu Gli 20 25 30 |
| il 4mil 16 | | Lys |
| # # | 25 | (2) INFORMATION FOR SEQ ID NO:55: |
| ≟ (| 71 | (i) SEQUENCE CHARACTERISTICS: |
| mil in the firm | 30 | (A) LENGTH: 20 amino acids (B) TYPE: amino acid (D) TOPOLOGY: linear |
| | | (ii) MOLECULE TYPE: peptide |
| | 35 | (v) FRAGMENT TYPE: internal |
| | 40 | (xi) SEQUENCE DESCRIPTION: SEQ ID NO:55: |
| | 40 | Ala Lys Ser Thr Trp Tyr Gly Lys Pro Thr Gly Ala Gly Pro Lys As |
| | 45 | Asn Gly Gly Ala 20 |
| | • | (2) INFORMATION FOR SEQ ID NO:56: |
| | 50 | (i) SEQUENCE CHARACTERISTICS: (A) LENGTH: 20 amino acids (B) TYPE: amino acid |
| | | (n) TOPOLOGY linear |



| | (ii) MOLECULE TYPE: peptide | |
|-----|---|-----|
| 5 | (v) FRAGMENT TYPE: internal | |
| | (xi) SEQUENCE DESCRIPTION: SEQ ID NO:56: | |
| 10 | Glu Ser Trp Gly Ala Val Trp Arg Ile Asp Thr Pro Asp Lys Leu Thr 1 10 15 | • |
| 15 | Gly Pro Phe Thr | |
| | (2) INFORMATION FOR SEQ ID NO:57: | |
| 20 | (i) SEQUENCE CHARACTERISTICS: (A) LENGTH: 1181 base pairs (B) TYPE nucleic acid (C) STRANDEDNESS: single (D) TOPOLOGY: linear | |
| 25 | (ii) MOLECULE TYPE: cDNA | |
| 91 | (ix) FEATURE: (A) NAME/KEY: CDS | |
| 30 | (B) LOCATION: 53124 | |
| 25 | (ix) FEATURE: (A) NAME/KEY: CDS (B) LOCATION: 125961 | |
| 35 | (xi) SEQUENCE DESCRIPTION: SEQ ID NO:57: | |
| | GAATTCGAGG ATCCGGGTAC CATGGCTCCG ACAAACCAAC GCAAGAGCAG CA ATG | 55 |
| 40 | | |
| 4.5 | GCA GTG CAG CAG TAC ACG GTG GCG CTG TTC CTG GCC GTG GCC TCG TGT Ala Val Gln Gln Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Ser Cys -20 -15 -10 | 103 |
| 45 | CGG GCC CGC GCC TCC TAC GCC GCC GAC GCC GGC TAC GCC CCC GCC ACT Arg Ala Arg Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Ala Pro Ala Thr -5 1 5 | 151 |
| 50 | CCC GCC ACC CCG GCT ACC Pro Ala Thr Pro Ala Thr Pro Ala Ala Pro Gly Ala Ala Val Pro Ala 10 20 25 | 199 |







| | | | | | | | 1 | | | | | | | | | | | | |
|-------------|----|------------|------------------|-----------------------|-------------------|-------------------|------------|------------------|-----------------------|-------------------|-------------------|------------|------------------|------------------|-------------------|-------------------|-------------------|---------|-----|
| | 5 | GGG Gly | AAG Lys | GCG Ala | GCG Ala | ACC Thr 30 | GAG Glu | GAG Glu | CAG Gln | AAG Lys | CTG Leu 35 | ATC Ile | GAG Glu | AAG Lys | ATC Ile | AAC Asn 40 | GCC Ala | | 247 |
| | 3 | Gly | Phe | Lys | Ala 45 | Ala | Val | Ala | Ala | Ala 50 | Ala | Gly | Val | CCG Pro | Pro 55 | Gly | Asp | | 295 |
| | 10 | Lys | Tyr | Lys 60 | Thr | Phe | Val | Glu | Thr 65 | Phe | Gly | Lys | Ala | TCC Ser 70 | Asn | Lys | Ala | | 343 |
| | 15 | TTC Phe | CTG Leu 75 | GGG Gly | GAC Asp | CTC Leu | CCG Pro | ACC Thr 80 | AAC Asn | TAC Tyr | GCC Ala | GAT Asp | GTC Val 85 | AAC Asn | TCC Ser | AGG Arg | GCC Ala | | 391 |
| | 20 | Gln 90 | Leu | Thr | Ser | Lys | Leu 95 | Asp | Ala | Ala | Tyr | Lys 100 | Leu | GCC Ala | Tyr | Asp | Ala 105 | | 439 |
| | 25 | GCC Ala | CAG Gln | GGC Gly | GCC Ala | ACC Thr 110 | CCC Pro | GAG GIu | GCC Ala | AAG Lys | TAC Tyr 115 | GAC Asp | GCC Ala | TAC Tyr | GTC Val | GCC Ala 120 | ACC Thr | | 487 |
| : | λ\ | CTC Leu | AGC Ser | GAG Glu | GCG Ala 125 | CTC Leu | CGC Arg | ATC | ATC Ile | GCC Ala 130 | GGC Gly | ACC Thr | CTC | GAG Glu | GTC Val 135 | CAC | GCC Ala | | 535 |
| | 30 | Val | Lys | Pro 140 | Ala | .Ala | Glu | Glu | Val 145 | Lys | Pro | Ile | Pro | Ala 150 | Gly | Glu | CTG Leu | | 583 |
| | 35 | Gln | 11e 155 | Val | Asp | Lys | Ile | 160 | Val | Ala | Phe | Arg | Thr 165 | Ala | Ala | Thr | GCC Ala | | 631 |
| | 40 | Ala 170 | Asn) | a Ala | Ala | Pro | Thr 175 | Asn | Asp | Lys | Phe | Thr 180 | Val | Phe | Glu | Thr | ACC Thr 185 | | 679 |
| | 45 | Phe | a Asr | ı Lys | a Ala | 11e | Lys) | s Glu | ı Ser | Thr | Gly 195 | Gly | Thr | Tyr | Glu | 200 | | | 727 |
| | - | AA(Ly: | TTC Phe | C ATT | 205 | Thi | CTT | GAC Glu | GCC 1 Ala | GCC Ala 210 | . Val | Lys | G CAC | G GCC | TAC Tyr 215 | Ala | GCC Ala | | 775 |
| | 50 | ACC Th: | C GTO | C GCA 1 Ala 220 | a Sei | C GCC | G CCC | G GAC | G GTC 1 Val 225 | L Lys | TAC Tyl | GCC Ala | C GTO | 230 | e Glu | ACO 1 Thi | C GCG Ala | | 823 |





CTG AAA AAG GCG GTC\ACC GCC ATG TCC GAG GCC CAG AAG GAA GCC AAG 871 Leu Lys Lys Ala Val \Thr Ala Met Ser Glu Ala Gln Lys Glu Ala Lys 240 235 5 CCC GCC ACC GCC ACC CCC ACC GCA ACT GCC GCG GCC GCG GTG 919 Pro Ala Thr Ala Thr Pro Thr Pro Thr Ala Thr Ala Ala Ala Val 260 255 250 GCC ACC AAC GCC GCC GCC GCT GCT GGT GGC TAC AAA ATC 961 10 Ala Thr Asn Ala Ala Pro Val Ala Ala Gly Gly Tyr Lys Ile 270 TGATCAACTC GCTAGCAATA TACACATCCA TCATGCACAT ATAGAGCTGT GTATGTATGT 1021 15 GCATGCATGC CGTGGCGCCG CGCAAGTTTG CTCATAATTA ATTCTTGGTT TTCGTTGCTT 1081 GCATCCACGA GCGACCGAGC CCGTGGATAG TCGCATGTGT ATGTAATTTT TTCTGAGAAA 1141 1181 20 (2) INFORMATION FOR SEQ ID NO 58: (i) SEQUENCE CHARACTERISTICS: (A) LENGTH: 279 amino acids (B) TYPE: amino acid (D) TOPOLOGY: linear (ii) MOLECULE TYPE: protein 30 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:5: Ala Asp Ala Gly Tyr Ala Pro Ala Thr Pro Ala Thr Pro Ala Thr Pro 10 35 5 Ala Ala Pro Gly Ala Ala Val Pro Ala Gly Lys Ala Ala Thr Glu Glu 25 Gln Lys Leu Ile Glu Lys lle Asn Ala Gly Phe Lys Ala Ala Val Ala 40 Ala Ala Gly Val Pro Pro Gly Asp Lys Tyr Lys Thr Phe Val Glu 55 45 Thr Phe Gly Lys Ala Ser Asn Lys Ala Phe Leu Gly Asp Leu Pro Thr Asn Tyr Ala Asp Val Asn Ser Arg Ala Gln Leu Thr Ser Lys Leu Asp 90 . 50

Ala Ala Tyr Lys Leu Ala Tyr Asp Ala Ala Gln Gly Ala Thr Pro Glu



| | | | | | 1 | | | | | | | | | | | |
|----|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | | | | 100 | | | | | 105 | | | | | 110 | | |
| 5 | Ala | Lys | Tyr 115 | Asp | Ala | Tyr | Val | Ala 120 | Thr | Leu | Ser | Glu | Ala 125 | Leu | Arg | Ile |
| | Ile | Ala 130 | Gly | Thr | Leu | Glu | Val 135 | His | Ala | Val | Lys | Pro 140 | Ala | Ala | Glu | Glu |
| 10 | Val 145 | Lys | Pro | Ile | Pro | Ala 150 | Gly | Glu | Leu | Gln | Ile 155 | Val | Asp | Lys | Ile | Asp 160 |
| | Val | Ala | Phe | Arg | Thr 165 | Ala | Ala | Thr | Ala | Ala 170 | Asn | Ala | Ala | Pro | Thr 175 | Asn |
| 15 | Asp | Lys | Phe | Thr 180 | Val | Phe | Glu | Thr | Thr 185 | Phe | Asn | Lys | Ala | Ile 190 | Lys | Glu |
| 20 | Ser | Ťhr | Gly 195 | Gly | Thr | Tyr | Glu | Ser 200 | Tyr | Lys | Phe | Ile | Pro 205 | Thr | Leu | Glu |
| 20 | Ala | Ala 210 | Val | Lys | Gln | Ala | Tyr 215 | Ala | Ala | Thr | Val | Ala 220 | Ser | Ala | Pro | Glu |
| 25 | Val 225 | Lys | Tyr | Ala | Val | Phe 230 | Glu | Thr | Ala | Leu | Lys 235 | Lys | Ala | Val | Thr | Ala 240 |
| | Met | Ser | Glu | Ala | Gln 245 | Lys | Glu | Ala | Lys | Pro 250 | Ala | Thr | Ala | Thr | Pro 255 | Ţhr |
| 30 | Pro | Thr | Ala | Thr 260 | | Ala | Ala | Ala | Val 265 | Ala | Thr | Asn | Ala | Ala 270 | Pro | Val |
| | Ala | Ala | Gly | Gly | Tyr | Lys | Ile | | | | | • | • | | | |